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ABSTRACT

These space planning guidelines are intended to be used as aids in determining space needs for the allocation and reallocation of existing space and new space. Directed to identifying types and amounts of nonresidential facilities required by departments on a campus, the manual is organized by 12 room-use categories that include classroom, teaching laboratory, research laboratory, office, and library. Differences in educational programs are recognized by incorporating different variables to determine facilities needs such as full-time-equivalent students, weekly student contact hours, and module sizes that differ by discipline or personnel type. Space planning formulas from nine states and their higher education coordinating boards were reviewed prior to compiling the formula used in this guide. Information was also reviewed from five universities and the province of Ontario (Canada). Four exhibits demonstrate the formulas and ranges. The appendices contain room-type descriptions, a conversion table of credit hour to weekly student contact hour for classroom and instructional laboratory use, and staffing categories. (MLF)

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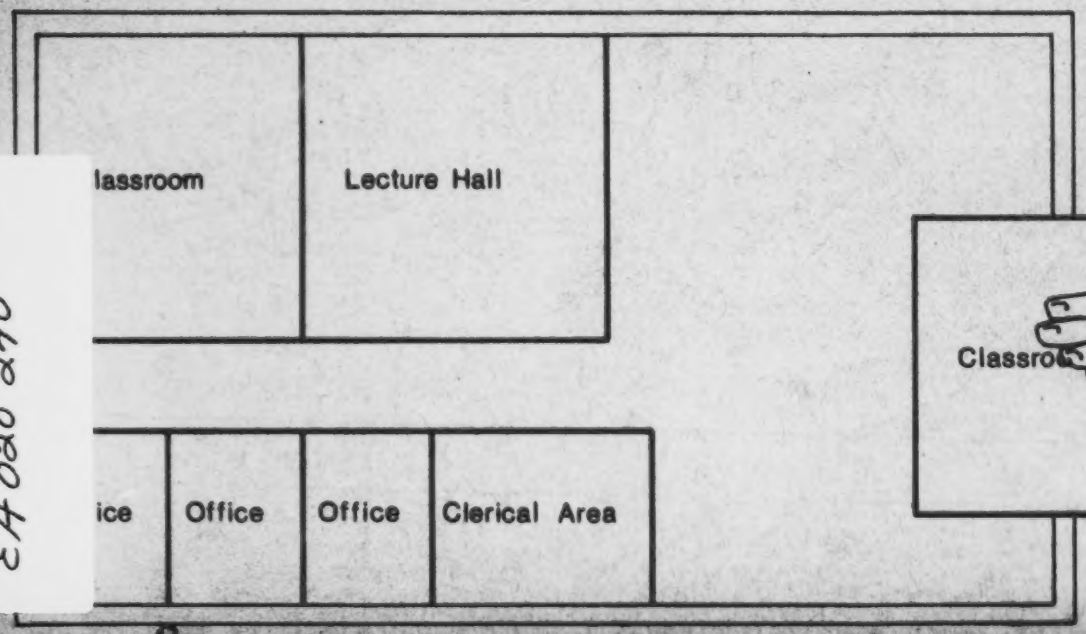
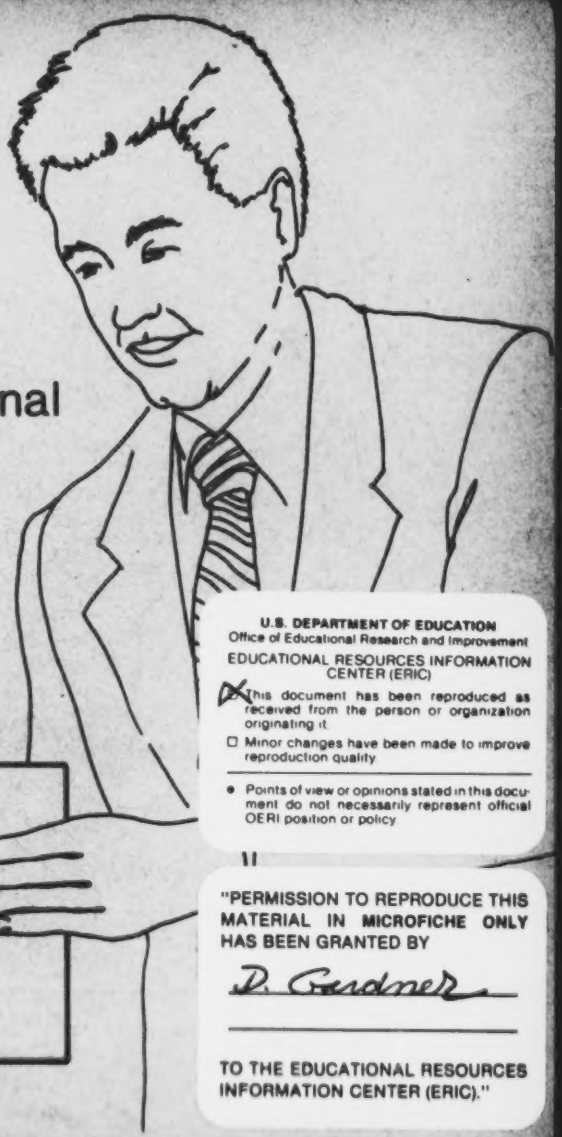
Space Planning Guidelines

Council of Educational Facility Planners, International
July 1985





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SPACE PLANNING GUIDELINES FOR INSTITUTIONS OF HIGHER EDUCATION

COUNCIL OF EDUCATIONAL FACILITY PLANNERS, INTERNATIONAL
JULY 1985

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Introduction

The space planning guidelines contained herein are intended to be used as aids in determining space needs for an institution's organizational units and group of units for the allocation and reallocation of existing space and/or the acquisition and construction of new space. The guidelines are directed to identifying types and amounts of non-residential facilities that are required by departments on a campus. These are guidelines and not standards. Each institution should select planning modules which address its institutional mission, program mix, teaching techniques, and philosophies.

To a limited extent, these guides do recognize differences in educational programs by incorporating different variables to determine facilities needs—variables such as full time equivalent (FTE) students, weekly student contact hours (WSCH), and module sizes that differ by discipline or personnel type. Further, an institution can tailor a formula to meet its individual needs by including a utilization projection based on the rate an institution expects to use, for example, its classroom or laboratory space.

These guidelines are planning factors intended to be used in conjunction with other program analyses to determine an institution's overall facilities needs. Additional analyses should be conducted to explore building structures and conditions to develop actual remodeling and renovation plans and/or design criteria for new construction.

This manual is organized by room use category as identified in the Higher Education Facilities Inventory and Classification Manual (1972: WICHE). The corresponding Facilities Planning and Management Manuals (1970: WICHE) were reviewed along with the wealth of different planning formulae currently in use by institutions and states across the country (see the following listing of credits). In one sense, the review was a balanced one in that the methods developed during the enrollment expansion of the 1970s were compared with methodologies in use during higher education's period of declining enrollments—the 1980s. However, most of the new methodologies were developed by state coordinating boards, the focus of which was to equalize the capital demands among the various institutions in a given state. This manual attempts to bring the best of these sources together to focus on the needs of the individual institution—from the institutional perspective rather than that of the state coordinating board.

Credit: Space planning formulas from the following states and their higher education coordinating boards were reviewed prior to compiling this formula for CEFPI: Iowa, Florida, Maryland, Minnesota, New Jersey, Ohio, Texas, Virginia, and Wisconsin. In addition, information was also reviewed from the Canadian Province of Ontario, City University of New York, State University of New York, The Ohio State University, University of Maryland-College Park and the University of Illinois-Urbana/Champaign.

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Note: Room use categories not included in these guidelines are those which are heavily dependent on local market factors, as follows: armory (510, 515), spectator seating (523), food facilities (630, 635), parking structures (part of 740 and 745), food stores (750), central laundry (760), and residence facilities, including general use facilities located in these buildings (all 900, some 600). Although these categories are excluded from determination by formula, actual space in these categories should be included as a part of total space to be maintained when called for in formulas for other room use categories.

Descriptions of each room type are provided in Appendix A.

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Classroom
(110)

General Formula

The total amount of classroom space (110, 115) required by an institution can be calculated by multiplying an assignable square foot (ASF) rate (or space factor) per weekly student contact hour (WSCH) by the total number of WSCHs generated in classrooms during a fall semester.

Assignable Square Foot (ASF) Rate or Space Factor x
Total Fall Weekly Student Contact Hours (WSCH) =
Total Classroom Space

Specific Calculation

The ASF/WSCH rate (or space factor) will vary for different types and sizes of institutions and for different types of classrooms. Exhibit I provides the formula and sample calculations for different institutions and room subtypes. The calculation which generates the ASF rate is a function of three different factors:

— Assignable square feet (ASF) per student station,

— Room use rate, and

— Station occupancy rate.

None of these factors is set, but can be tailored to an institution's individual needs. The first factor, ASF per student station, includes the space for each student station as well as the support space such as storage for each. It varies by institution and room subtype. Lecture halls with fixed seating and multi-levels require less space per station than general classrooms, whether stations are fixed or movable. Seminar rooms, of course, are smaller and require more space per station. These sizes are suggested but probably will vary less than the room use or station occupancy rates.

The room use rate is the percent of time a room is used each week. It is normally based on a 45 hour week (see Exhibit I). The station occupancy rate is the percent of stations or seats in use when a room is in use. These two rates depend on several factors—i.e., whether an institution has the right sized rooms for its program mix and enrollment, whether there is a good scheduling system, and whether there are remote sub-campus areas. Institutions which need or want to accommodate afternoon student work and faculty research schedules will project a lower weekly room use. Those with remote sub-campus areas may want to use lower room use for those areas because these rooms would not be scheduled as heavily. Institutions with heavy evening schedules may want to apply the evening room use to the formula. Institutions which wish to convert some classroom space to other uses may want to increase the room use and station occupancy rates. To consider these individual differences, ranges of use are suggested for the room use and station occupancy rates. Specific average rates are given, too, so that the sample space factors could be generated.

Exhibit I

Classroom Space Guidlines

(Room Type 100)

Formula, Ranges, Sample Space Factors

Examples based on a 45 Hours Per Week

	CLASSROOMS								LECTURE HALLS								SEMINAR ROOMS							
	ASF Per Student Station (a)		Room Utilization Rate (b)		Station Occupancy Rate (c)		Space Factor (d)		ASF Per Student Station (a)		Room Utilization Rate (b)		Station Occupancy Rate (c)		Space Factor (d)		ASF Per Student Station (a)		Room Utilization Rate (b)		Station Occupancy Rate (c)		Space Factor (d)	
Two Year Institutions																								
	16	÷	(31.5	x	.650)	=	.781		12	÷	(25	x	.625)	=	.768		20	÷	(25	x	.625)	=	1.280	
Comprehensive Colleges																								
0-3,000 FTE's	15	÷	(31.5	x	.650)	=	.733		12	÷	(25	x	.625)	=	.768		20	÷	(25	x	.625)	=	1.280	
over 3,000 FTE's	15	÷	(31.5	x	.667)	=	.714		12	÷	(30	x	.650)	=	.615		20	÷	(30	x	.625)	=	1.067	
Doctoral Granting Institutions																								
	15	÷	(30	x	.625)	=	.800		12	÷	(30	x	.650)	=	.615		20	÷	(30	x	.625)	=	1.067	

(a) The ASF per student station could range from 11 to 14 for lecture halls, 15 to 18 for classrooms and 18 to 21 for seminar rooms.

(b) Room Utilization Rate: Projected or actual hours a room is used during the average 45 hour week (8:00 a.m. to 5:00 p.m.)

27 = 45 hours x .600 room use rate
30 = 45 hours x .667 room use rate
31.5 = 45 hours x .700 room use rate
35 = 45 hours x .778 room use rate

If projected or actual hours that a room is used during the week is 50 (8:00 a.m. to 6:00 p.m.) the utilization rate would be:

30.0 = 50 hours x .600 room use rate
33.3 = 50 hours x .667 room use rate
35.0 = 50 hours x .700 room use rate
39.0 = 50 hours x .778 room use rate

(c) Station Occupancy Rate: Projected or actual percent of average station occupancy when a room is in use.

(d) Space Factor: Planning guide (ASF/WSCH) to be multiplied by weekly student contact hours (WSCH) to project the total amount of space needed in this category.

The specific calculation for the space factor follows.

ASF Per Student Station :
[(Total Hours per Week Room is Available for Use X Percent Use)
x Station Occupancy]=
Assignable Square Foot Rate (or Space Factor)

Dividing classrooms into subtypes will require the weekly student contact hours (WSCH) to be split among these subtypes as well. To avoid this an institution may want to generate a total space factor by weighing the subtypes according to their proportion of the classroom space, either by ASF or total number of rooms.

Once a space factor (ASF/WSCH) is determined multiply it by the number of weekly student contact hours which occur during the time frame established by the space factor. For example, if you use a 45 hour week (Monday thru

Friday from 8 to 5 o'clock), determine the number of student contact hours (time spent within the classroom) for that time frame.

Institutions which do not have utilization data can use a factor of 1.06 times the number of credit hours offered during that time frame. This figure will provide the total amount of contact hours for all room types in use. In order to estimate the contact hours for classrooms, multiply the total by 75%. This is an overall institution percentage. To determine individual department or college totals, use the conversion table in Appendix B.

Teaching Laboratory

(210/220/230)

General Formula

The total amount of teaching laboratory space (210, 220, 230 room use categories) required by an academic department can be calculated by applying a station module size to a use factor (a combination of room use and station occupancy goals) and to the department's total weekly student contact hours (WSCH) generated in teaching labs.

Dept Teaching Lab Space (210,220,230)	= station module size	x use factor	x weekly student contact hours (WSCH)

Specification

A. Station Module Size

The Planning Module Ranges (Exhibit II) are suggested ranges for station module size by selected HEGIS (Higher Education General Information Survey) discipline groupings (or departments).

B. Use Factor

The use factor is the reciprocal of multiplying the hours a lab is expected to be used by the projected percentage of station use.

$$\frac{1}{\text{Room Hours (Projected)}} \times \frac{1}{\text{Station Use (Projected)}} = \text{Use Factor}$$

Use factors can be projected averages for an entire institution or they can be applied by college or department (with appropriate rationale by a unit and scrutiny by the institution). Suggested average use factors are:

For Groups A and B $\frac{1}{22.5} \times \frac{1}{80\%} = 1/18 \text{ or } .056$

For Group C $\frac{1}{11.25} \times \frac{1}{80\%} = 1/9 \text{ or } .111$

Group A includes those departments which have minimal teaching lab requirements and which often cannot generate sufficient weekly student credit hours (WSCH) to produce enough laboratory space to meet their actual space needs. Generally included in Group A are the social sciences, business and management, communications, computing, education, languages, law, mathematics, psychology, and the social sciences.

Group B includes those departments with definite lab requirements, usually containing fixed equipment, but with limited need for a variety of lab types (usually 210s only). Generally included in Group B are the physical sciences and biological sciences.

Group C includes departments similar to those in Group B, but which require a wider variety of laboratory types (usually 210s, 220s, and 230s) or considerable independent lab work. Generally included in Group C are engineering, the health professions, and agriculture.

C. Weekly Student Contact Hours

Weekly student contact hours (WSCH) are the equivalent of one student using one station during one hour per week in a class lab (210), special class lab (220), and individual study lab (230). Departments which cannot generate sufficient WSCH to meet their actual space needs (Group A) can be assigned a minimum value. For example, if a department generates less than 360 WSCH in labs, it can be assigned 360 WSCH. If there are zero WSCH generated by a department, then no value is applied. The suggested 360 minimum value is based on 50% of 45 room hours per week multiplied by 80% station use [(.50 X 45) X (.80 X 20 minimum stations)]. This minimum value can be applied to departments in Group A.

Institutions which do not have utilization data can use the conversion table in Appendix B to determine the number of weekly student contact hours (WSCH) for each type of laboratory.

Exhibit II
Planning Module Ranges

HEGIS	Discipline	Assignable Square Feet: Teaching Labs			Assignable Square Feet: Research Labs		
100	Agriculture	40	to	80	250	to	300
	102 Agronomy	65		70	250		400
	104 Animal Sciences	60		90	250		350
	105 Dairy Science	60		70	250		350
	106 Poultry Science	60		65	250		350
	108 Horticulture	50		65	200		300
	111 Ag Economics	30		40	40		60
	113 Food Science and Technology	60		80	300		350
	115 Natural Resource Management	35		50	140		160
200	Architecture	60		80	80		120
400	Biological Sciences	50		65	275		350
500	Business and Management	30		40	60		80
600	Communications	40		50	50		100
700	Computer and Information Science	40		60	50		80
800	Education	35		40	60		90
900	Engineering	80		120	300		375
	902 Aerospace and Aeronautical Engineering	80		140	325		425
	903 Agricultural Engineering	100		125	325		425
	906 Chemical Engineering	90		120	250		350
	908 Civil/Construction/Transport	100		120	325		425

HEGIS Discipline		Assignable Square Feet			
		Teaching Labs		Research Labs	
	909 Electrical/Electronics/ Communications	80	100	250	350
	910 Mechanical Engineering	100	140	300	375
	913 Industrial and Management Engineering	70	120	200	300
	914 Metallurgical Engineering	90	120	300	375
	916 Ceramic Engineering	100	120	300	375
	917 Textile Engineering	100	120	300	375
	918 Mining and Mineral Engineering	140	160	350	450
	921 Engineering Mechanics	120	150	250	350
1000	Fine and Applied Arts				
	1002 Art	60	80	150	200
	1003 Art History	30	35	40	50
	1004 Music	45	60	40	50
	1008 Dance	100	150	75	125
1100	Foreign Languages	30	40	60	90
1200	Health Professions (except Medicine)	60	80	200	300
	1203 Nursing	55	65	40	50
	1204 Dentistry	60	70	150	250
	1209 Optometry	70	80	225	275
	1211 Pharmacy	60	70	220	250
	1218 Veterinary Medicine	60	90	275	375
1300	Home Economics	50	60	150	200
1400	Law	40	50	65	85
1700	Mathematics	20	30	65	85

HEGIS Discipline		Assignable Square Feet			
		Teaching Labs		Research Labs	
1900	Physical Sciences	60	75	275	350
1902	Physics	60	75	275	375
1905	Chemistry	60	75	275	375
1911	Astronomy	50	60	150	200
1914	Geology	50	60	275	375
1920	Metallurgy	70	90	275	325
2000	Psychology	40	50	175	225
2200	Social Sciences	30	50	75	100
2202	Anthropology	50	60	100	200
2204	Economics	30	40	75	100
2205	History	20	30	75	100
2206	Geography	50	60	75	100
2207	Political Science	30	40	75	100
2208	Sociology	30	40	75	100

Research Laboratory

(250)

There are numerous methods used by institutions to determine the amount of research laboratory space required by each discipline. While there is some consensus as to the laboratory module size, the method of determining the number of persons doing research at any one time differs considerably.

Two formulas are presented here. An institution should select the one it feels produces the most desirable results.

Both formulas use the laboratory modules in Exhibit II.

Research Laboratory Formula #1

The total amount of research laboratory space required by a department is based on the percent of masters and doctoral students, the percent of technicians, and the percent of faculty conducting research at any one time. These percentages are then applied to module sizes.

[(% conducting research x masters headcount) +
(% conducting research x doctoral headcount) +
(% conducting research x technician headcount) +
(% conducting research x faculty headcount)] x module size =
Departmental Research Laboratory Space

Specific Calculation

The percentages of masters and doctoral students and technicians conducting research are determined through discussions with academic departments. The percentage of faculty doing research is determined by the department's distribution of effort or faculty activity report. An FTE of one is applied when a single faculty member reports 40% or more effort in research.

The module sizes are based on the average requirement for each researcher within a department. The Planning Module Ranges (Exhibit II) are suggested ranges for station module sizes by selected HEGIS groupings (or departments).

Special Note: This formula for teaching and research laboratory space applies only to the 200 series of room use types and does not apply to special use facilities such as aircraft hangars, greenhouses, animal quarters, audio-visual space, data processing rooms, wind tunnels, nuclear reactors, and herbariums.

Research Laboratory Formula #2

A second method of determining research laboratory space for each discipline is based on the sum of (a) the headcount of full-time resident faculty plus (b) the headcount of graduate faculty times the ratio of thesis plus dissertation graduate students per headcount graduate faculty (use 3.0 as a minimum) times the module size. The Planning Module Ranges (Exhibit II) are suggested ranges for station module sizes by selected HEGIS groupings (or departments).

This method could be used by those institutions which do not have the data base to determine the percentage of faculty, masters and doctoral students, and technicians who conduct research at any given time.

Examples of both research laboratory formulas are provided in Exhibit III.

Exhibit III

Examples of the Research Laboratory Formulas for Estimating Chemistry Research Lab Space

Formula #1

20 Masters students x . 70	= 14	
110 Doctoral students x .80	= 88	
30 Post-doctoral/technicians x 1.00	= 30	
30 Faculty x .90	= 27	
	159	Total researchers
	x 325	Module size
	51,675	Assignable square feet

Formula # 2

30 Faculty	= 30	
24 Graduate faculty x 5.4 (ratio of thesis plus dissertation graduate students per headcount graduate faculty)	= 130	
	160	Total researchers
	x 325	Module size
	52,000	Assignable square feet

Office
(300)

General Formula

The total amount of office space required by an institution can be calculated by applying module sizes (in assignable square feet) to personnel requiring office space. Module sizes and FTE calculations differ by personnel type, but the general formula can be stated as follows:

Module Size x Number of Personnel =
Total Office and Service Space (300s) and Lounge Space (650s)

Specific Calculations and Definitions

Exhibit IV, entitled Office Space Guidelines Sizes and Ranges, suggests FTE calculations by type of staff and the ranges of module sizes by staff type and office need. Only those staff types requiring offices are included. For example, skilled Crafts and Service/Maintenance staff types are excluded totally (see Appendix C). Technical/Para-professional are included because some will require office space. How many of these personnel do in fact require offices depends on the type of department. For example, most hospital staff and such staff in laboratory research units will not. Another category of staff which does not in total require office space is graduate students. Only teaching assistants and non-laboratory science graduate assistants should be included in the calculation. The numbers of such personnel requiring office space can be determined in discussion with individual work units.

The full-time equivalent (FTE) calculation is headcount except for faculty. Faculty of 0.5 FTE or more should be counted as headcount: faculty of less than 0.5 FTE should be counted as FTE. This accommodates office sharing for part-time instructors and lecturers.

In addition to actual office space needs, the subtypes include supplements for special needs. A supplement of auxiliary and service needs (such as for files, copiers, reception, and conference) is included for each staff type except graduate students and part-time student workers. An additional supplement for private conference area is included for the executive/administrative/managerial staff type. A small supplement for lounge space (650) should be determined here. It should be noted, however, that this is space to which employees need access in the given building; departments need not be assigned individual space of this type. The small auxiliary/service supplements are predicted on medium to large departmental or administrative units. Small units will require additional supplements for reception and conference space, as noted in Exhibit III. Additional supplements are needed for academic disciplines requiring in-office studio, drafting, or library space as well.

The ranges of module sizes consider the different types of institutions. In general, two-year institutions will be in the lower end of the range and doctoral granting institutions will be at the upper end of the range.

Institutions with older buildings housing oversized offices which are not easily reducible may want to use actual square foot averages of the offices as modules for departments occupying this type of space.

Exhibit IV

Office Space Guidelines
(Room Type 300)
Formula and Ranges

A. Type of Staff(a) Office Subtype	FTE Calculation	Module Size Ranges (Assignable Square Feet)
1. Executive/Administrative	Headcount	
— office		140-180
— conference		40-60
— auxiliary/service		15-30
— lounge		5-10
2. Faculty	Headcount > 0.5 FTE < 0.5	
— office		110-140
— auxiliary/service		15-30
— lounge		5-10
3. Professional Non-Faculty	Headcount	
— office		120-150
— auxiliary/service		15-30
— lounge		5-10
4. Technical/Paraprofessional	Headcount	
— office		110-140
— auxiliary/service		15-30
— lounge		5-10
5. Clerical/Secretarial	Headcount	
— office		90-120
— auxiliary		15-30
— lounge		5-10

6. Graduate Students — office only	Headcount	40-70
7. Part-time students — office only	FTE	40-70

B. Special Needs Supplement

1. Faculty requiring studio or extra space; e.g., music, law, architecture, and art	HC > 0.5 FTE < 0.5	40-80
2. Small departments (minimum requirements)		
— 0-5 FTE staff (b) for reception		100-120
— 6-15 FTE staff (b) for conference		150-200
— 16-25 FTE staff (b) for conference		50-60

(a) See Appendix C for descriptions.
(b) Includes faculty, professional non-faculty and Technical/Paraprofessional listed in Part A above. These are cumulative numbers so a department with 22 FTE staff could have 120 square feet for reception and 250 square feet for a conference room.

Library

(400)

General Formula

The total amount of library space required by an institution can be calculated separately for reading space, stack space, and service space for the main university and branch college or departmental libraries.

Library Space = Reading Space + Stack Space + Service Space + Lounge and Merchandising
(410, 420, 430, 440, 445, 650, 655, 660, 665)

The reading space can be calculated by applying a reasonable percentage of students and faculty who should be able to study at a given time to FTE enrollment and faculty headcount and multiplying the product by station size.

Reading space = (faculty and students x percent using library) x ASF per reading station

Stack space can be calculated by converting all documents to volumes and multiplying the products by a square foot per volume rate. This calculation should exclude all volumes in compact storage.

Stack space = documents x ASF per volume

Service space can be calculated by applying a percentage rate to the reading space and stack space totals.

Service space = (reading space + stack space) x
service percent rate

Lounge space and merchandising facilities can be calculated by applying an ASF rate to the number of library users.

Lounge and Merchandising = (ASF rate x (faculty and students times
percent using library)

Specific Calculation

A. Reading Space

Percentage rates for faculty and student FTE are suggested below.

	Universities with College and Department Libraries		Institutions w/o Local Libraries	Law Libraries
	Main Library	Local Libraries		
Student				
— Lower Division	10	5	15	45
— Upper Division	5	10	15	45
— Masters	5	20	20	45
— Doctoral	5	20	20	45
Faculty	5	5	10	45

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Square foot per reading station is suggested at 25 ASF for all types of libraries except law libraries, which is suggested at 30 ASF. Total FTE enrollment and FTE faculty should be used for institution-wide libraries; department or college FTE enrollment and faculty should be used for local (including law) libraries.

B. Stack Space

Conversation factors of HEGIS categorization of library collections are:

1 bound volume book stock and bound periodicals
80 microforms (excluding reels, including duplicate titles)
3 microfilm reels (include duplicate titles)
5 audio-visual materials (audio recording, filmstrips, slides, overhead transparencies, video discs, multi-media kits; exclude motion pictures and video tapes)
1 video tape and motion picture
8 other, flat library materials (flat pictures, study print sets, maps, charts, games)

The conversion totals for the main university library and for college and university branches can be applied to the suggested rates of ASF per volume:

.10 ASF/Volume for 0-150,000 volumes
.09 ASF/Volume for 150,001-300,000 volumes
.08 ASF/Volume for 300,001-600,000 volumes
.07 ASF/Volume for 600,001 and more volumes

Law Libraries should apply .15 for ASF/volume to all of their volumes.

A growth rate can be applied to the stack collection; a rate of 2.5 percent per year is suggested.

C. Service Space

The following percentage rates should be applied to the total reading and stack space to calculate service space:

Local Libraries: 10-15% (if binding is done elsewhere)
Main and Law Libraries: 20-25%

D. Lounge and Merchandising Space

An increase of 3 ASF per user should be applied to the total number of library users determined for reading space to allow for some lounge-study facilities where food and drink machines are allowed.

E. Compact Storage

Storage of library materials can be reduced substantially by compact shelving. The assignable square foot per volume is approximately .02 as compared to .07 to .10 for standard library shelving. Depending on the arrangement of the storage sections nearly 525,000 volumes could be stored in 10,000 square feet of space. This could vary slightly depending on the number of sections in a range and the number of ranges within a system or area.

Normally sections are 24 inches wide (double faced volumes) and 36 inches long. Ranges may contain up to 25 or more sections.

Recreational/Physical Education/Athletics

(520)

Indoor space for recreational/physical education activities. A core of space for recreation/physical education utilization is required regardless of the size of a campus. The core is then expanded as a proportional relationship to the total number of students to be served.

Recreational/Physical Education Space Requirement

Predictor: Use Headcount (HC) number of students if below 2,000.
Use FTE Students when headcount of students is 2,000 or above.

Allowance: Core Requirement (1,000 students) = 20,000 ASF

Formula: Core Requirement plus number of students above core x 5 ASF = Recreational/Physical Education Space Requirement

It should be noted that this projection excludes seating used for athletic events and any space used primarily for intercollegiate athletic activity. Facilities used for both intercollegiate athletics and recreation/physical education should be prorated based on the time used by each.

Examples:

An institution with 2,100 students would require 25,500 assignable square feet. This would produce the following facilities:

1 Gymnasium	15,500	ASF
1 Wrestling/Exercise Room	4,000	
2 Locker Rooms	3,500	
2 Handball/Racquetball Courts	1,600	
1 Equipment Storage Room	900	
	25,500	ASF

An institution with 9,500 students would require 62,500 assignable square feet. This would produce the following facilities:

1 Gymnasium	22,500	ASF
1 Weight Room	800	
1 Golf/Archery Room	800	
1 Wrestling/Exercise Room	4,000	
1 Swimming Pool	9,500	
6 Handball/Racquetball Courts	4,800	
1 Track Area (could be located above the gym area)	12,000	
Locker Rooms/Showers	6,500	
Storage Areas	1,600	
	62,500	ASF

Audio/Visual/Television

(530)

The requirement for space in this group is represented by a basic core of space plus an additive factor. The core of space is determined by analysis of typical functions to produce an amount of space which each institution should allocate in accordance with its specific program elements. The core guideline of 9,800 assignable square feet (ASF) is developed in consideration of the following requirements:

Graphics	1,200	ASF
Photography	1,200	
Equipment and Materials Circulation	1,400	
Equipment Maintenance	600	
Studio	2,000	
Television/Audio Distribution	1,200	
Audio, Services and Radio	1,000	
Instructional Development	1,200	
TOTAL	9,800	ASF

This core of space will accommodate 4,000 FTE students. Additional undergraduate FTE would necessitate additional space at a rate of approximately 1 ASF per FTE. Graduate FTE would generate space at a rate of 2 ASF per FTE.

Square footage beyond that generated by this formula would depend upon the television instruction program of the institution. A commitment to such instruction would necessitate individually justified space requirements.

Space Definitions

1. Equipment maintenance space is similar to an electronic repair shop. The amount of space depends on the volume of work handled and the number of technicians required.
2. Production space varies with the type of studios required. Motion picture production generally requires very large spaces and substantial amounts of service for processing and editing. Television studios vary greatly in size, but they generally require large, high ceiling rooms plus large amounts of control and equipment space. Tape, film, and photographic reproduction facilities are largely determined by equipment. Graphic arts production can vary from very little space to a substantial area for equipment and construction.

Clinical (non-medical)/Demonstration

(540/550)

Clinical space which is categorized as 540/545 usually consists of examination rooms, testing rooms, consultation rooms served by waiting rooms, observation, and control rooms. The final determination of need for space of this type is dependent upon the level and complexity of program offerings in such areas as psychology, speech and hearing, etc.

Demonstration space (550/555) is difficult to project as it depends upon program development in the area such as child development and home economics. The formula outlined below will accommodate general needs in the 540/550 categories. Special programs may require additional space.

Formula:

Five assignable square feet per FTE student within each department requiring this type of space.

Example:

FTE students—	Home Economics	400
	Psychology	750
		1,150 x 5 = 5,750 ASF

Field Buildings/Animal Quarters/Greenhouses

(560/570/580)

Field buildings (560), animal quarters (570), and greenhouses (580) are specialized facilities which are calculated in a composite fashion. Demand for these spaces varies greatly and depends to a great degree upon the programmatic nature of an institution.

Formula:

Three ASF x total FTE students plus 25 ASF x FTE students within selected disciplines (departments)* plus 100 ASF x FTE faculty doing research within selected disciplines (departments).*

*These would include disciplines such as Biological Sciences, Agriculture, Veterinary Medicine, Psychology and Medicine.

General Use Facilities

(600)

Several different approaches were employed for development of space guidelines in the general use categories. Food facilities (630) are not addressed as they are primarily a function of market demand.

Assembly/Exhibition (610/620)

This guideline considers the differing levels of need for assembly (610) and exhibition (620) areas as the size of an institution increases. A basic core of space is required on all campuses, regardless of size. Space would increase when degree programs in speech/theatre and music are offered.

A. Basic Core

The basic core of space is developed to accommodate the primary exhibition needs of an institution. Generally oriented towards a campus with an FTE enrollment of 2,000, this core is designed for a limited Fine Arts program.

1. Seating area 1-400 seats @ 10 ASF each	4,000	
2. Stage and Wings	1,200	
3. Control room	200	
4. Storage	200	
	5,600	ASF

B. Enhanced Core

The core described above is increased to reflect the needs of a small college or university with an active Fine Arts program.

1. Seating Areas 1-400 seats @ 10 ASF each	4,000	
2. Stage and Wings	3,000	
3. Control Rooms	300	
4. Costume and Storage	1,500	
5. Scene Shop/Sets and Props Storage	2,500	
6. Lighting, Design, Storage and Repair	400	
7. Sound Effects Production	150	
8. Rehearsal Room	1,500	
9. Make-up and Dressing Rooms	750	
10. Green Room	400	
	14,500	
General Exhibition Space	1,500	
	16,000	ASF

C. Larger Core

The larger core is designed in recognition of the needs of a college or university with a minimum of 5,000 FTE and an active Fine Arts program. A degree program in speech/theatre would be accommodated with the larger stage and rehearsal facilities described.

1. Seating Areas Up to 500 seats @ 10 ASF each	5,000	
2. Stage and Wings	3,500	
3. Control Rooms	400	
4. Costume and Storage	2,000	
5. Scene Shop/Sets and Props Storage	5,000	
6. Lighting, Design, Storage and Repair	400	
7. Sound Effects Production	150	
8. Rehearsal Room	2,000	
9. Make-up and Dressing Rooms	1,000	
10. Green Room	500	
	19,950	
Exhibition Space	2,500	
	22,450	ASF

D. Music Option

On a larger campus, the addition of an extensive music program alters facility needs. An additional core component of 5,000 ASF should be added to the appropriate core space when such a program exists. This allocation provides space for recital activities.

A square feet-per-FTE factor is added to the core figures in recognition of additional needs in relation to enrollment. Over 5,000 FTE, use 6 ASF per all FTE over 5,000.

Formula:

Core requirement (plus music option if appropriate) plus ASF-per-FTE factor.

Example:

For an institution with 20,000 FTE students and with an extensive music program the space requirement would be 117,450 ASF.

Core requirement	22,450	ASF
Music option	5,000	
15,000 FTE students over the core	90,000	
	117,450	ASF

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Lounge/Merchandising (650/660)

Lounge (650) and merchandising (660) space is evaluated in several different ways. These distinctions were developed in an effort to assist in the proper distribution of this space on a campus.

1. *Departments*
   Lounges associated with departmental offices are projected in the office guideline model.
2. *Libraries*
   Lounge space in libraries is calculated as a component of the library guidelines.
3. *Individual Buildings*
   For individual buildings, lounge space is generated as a function of its potential total occupants. It is based upon the number of student instructional stations plus the number of non-office employees (technical/paraprofessional, skilled crafts, and service and maintenance). Only those employees not included as part of the departmental office and lounge calculation are intended to be in this formula.

Formula:

Total classroom and instructional laboratory stations plus headcount employees (non-office) x 1 ASF = Total building lounge and merchandising space requirement.

This formula is not designed to calculate student services space in a student union building. (Refer to 650/690 guideline). Lounges located in residence halls are excluded and should be developed as needed.

Student Services (650/690)

This guideline provides a means of evaluating required space for student service functions in a student union facility. Lounges (650), merchandising (660), recreational rooms (670), meeting rooms (680), and locker areas (690) are examples of spaces included in this category. This formula also accounts for additional meeting rooms, locker areas and recreational rooms often located in buildings other than the student union.

Formula:

FTE students x 9 ASF = Student Services Space Requirement.
Student service space located in residence halls is excluded from this formula.

Data Processing/Computer

(710)

This is a difficult category to project in that technology and utilization of such equipment is changing so rapidly. Certainly, adjustments to the basic formula will be made to justify larger needs due to intricate program mix, large research components, instructional approaches, and/or institutional philosophy in favor of heavily computerized operations and data base management systems. Computer and Information Science Instructional Laboratories are not included here. Space for these are determined as part of the Teaching Laboratories (210, 220, 230) formula.

General Formula

Core Space of 4,500 ASF +
(ASF rate x FTE >5,000) =
data processing and computing space (710 and 715)

Specific Calculation

A core space factor for a central computing area for a campus of 5,000 FTE students is based on the following:

Computer Room	2,000	
Maintenance Engineering	400	
Ready and Dispatch Rooms	1,600	
Keypunch Room and Auxiliary Equipment	500	
	4,500	ASF

Additional needs will range from 1 to 3.5 ASF per FTE students over the 5,000 student base.

Space in excess of these two factors should be justified independently, as discussed above.

Shop and Storage

(720/730/740)

Shop and storage space is developed as a percentage of all other space to be maintained. Existing square footage in the 720, 730, and 740 categories is excluded from the calculation process.

Formula

Space (ASF) calculated for room types 100 thru 715 plus 800's and 900's times eight percent = shop and storage space required.

Square footage used in development of this formula should be actual, not that amount generated by guidelines in this manual. Parking structures are excluded from this formula since they are justified on an institutional basis.

Appendix A

Room Type Descriptions

For the most part, these descriptions are taken from the Facilities Inventory and Classification Manual, the 1973 document compiled by the National Center for Higher Education Management Systems at WICHE (Western Interstate Commission for Higher Education), published by the Office of Education in the U.S. Department of Health Education and Welfare. The additional specificity in the description of classrooms was taken from the Higher Education Facilities Planning and Management Manuals. These were used because it was felt that the physical facilities inventories at most institutions follow these classifications.

100 Classroom:

A room used by classes that does not require special purpose equipment for student use. It is generally used for scheduled instruction and may be equipped with tablet arm chairs (either fixed to the floor, joined together in groups, or moveable in arrangement), tables and chairs, or similar types of seating. Subcategories include general classroom, lecture hall, seminar room, and departmental classroom. Included in this category are service rooms, space which directly serves classrooms for instruction-related activities, such as projection rooms, cloakrooms, preparation rooms, closets, and storage.

General Classroom: A room used for classes, usually 21-90 students, that does not require special purpose equipment for student use, may be equipped with tablet arm chairs, and furnished with some special equipment if it does not render the room unsuitable for use by classes of other areas of study. These rooms generally require 15-18 assignable square feet of space per student station including instruction and circulation space.

Lecture Hall: A room generally used for scheduled instruction of large groups normally 90 or more stations requiring no special equipment. These rooms generally require 11-14 assignable square feet of space per student station including instruction and circulation space.

Seminar Room: A room equipped with a large table and chairs, or multiple tables and chairs to form a large table, used for small/medium discussion type classes (normally between 5 to 20 stations). The space is sometimes assigned to a specific department. These rooms generally require 18-21 assignable square feet of space per student station including instruction and circulation space.

Departmental Classroom: A general classroom which is assigned to a specific department and is rendered unsuitable for general scheduling because the assigned department keeps special equipment in the room for departmental student and faculty access.

200 Laboratory:

210/220/230 Teaching Laboratory: A room type which is designed for and/or furnished with equipment to serve the needs of particular disciplines for instruction purposes. Includes class lab, unscheduled teaching lab and individual study lab, each of which requires special-purpose equipment for student participation, experimentation, observation, or practice in a field of study. While a **class lab** is used primarily for regularly scheduled classes, an unscheduled

teaching lab is used primarily by informally or irregularly scheduled classes, and an **individual study lab** is a room used primarily for individual student experimentation, observation, or practice. This category also includes **service areas** which directly serve one or more of these rooms as an extension of the activities in them, such as balance rooms, cold rooms, stock rooms, dark rooms, equipment issue rooms, and similar facilities, except animal rooms and greenhouses.

250 Research Laboratory: A non-class laboratory used for laboratory applications, research, and/or training in research methodology that requires special-purpose equipment for faculty, staff, and/or advanced student experimentation and observation. This category also includes service areas which directly serve one or more of these rooms as extensions of their activities, such as balance rooms, cold rooms, stock rooms, dark rooms, shops, and similar rooms, except animal rooms and greenhouses.

260 Special Use Laboratory: A room containing unique materials or specialized (often one of a kind) equipment (normally fixed), which is required for the function(s) to be performed in it rather than for the occupant(s) who may use the space. These rooms may be used for teaching and/or research by one or more departments and by authorized faculty or students, and are not assigned to any one user. Included in this category are rooms such as planetariums, nuclear reactors, herbariums and electron microscope laboratories. Also included are all service areas related to such facilities. There are no guidelines provided within these guidelines for this type of laboratory since they are so unique.

300 Office:

A room used by faculty, staff, and/or students and generally equipped with one or more desks, chairs, tables, bookcases, and/or filing cabinets. Included is office space for all types of users, such as faculty, administrators, clerical staff, technical/professional staff, graduate/teaching assistants, and students. Includes studio space, if that room also serves as an office. Includes service areas which directly serve one or more of these rooms as extensions of their activities, such as file rooms, mimeograph rooms, vaults, waiting rooms, interview rooms, closets, private toilets, records rooms, and office supply rooms. Also includes conference rooms that are used primarily for staff meetings and departmental activities other than instructional activities.

400 Library Space:

A room (or area) serving library activities (except offices), including reading/study rooms serving individuals studying books or audio-visual materials, stack space serving to provide shelving for library and audio-visual materials, combined open stack and reading rooms, processing rooms (such as those used to house card catalogs, circulation desks, bookbinding, microfilm processing, and audiovisual equipment for distribution), and service areas directly serving one or more of these rooms as direct extensions of their activities.

520 Recreational/Physical Education Space:

A room (or area) used by students or staff for recreational or physical education activities, such as gymnasiums, handball courts, squash courts, wrestling rooms, swimming pools, ice rinks, indoor tracks, indoor "fields," and field

houses. Includes service rooms which serve as direct extensions of the activities conducted in such facilities, such as locker rooms, shower rooms, dressing rooms, equipment supply rooms, first-aid rooms, towel rooms, etc. Includes such facilities which are shared with intercollegiate athletic programs but excludes facilities which are exclusively used for athletic programs. Also excludes spectator seating.

530 Audio/Visual/Television Space:

A room or group of rooms used for the production and distribution of audiovisual, radio, and TV materials, and for the operation of equipment for the communication of these materials, such as TV studios, radio studios, sound studios, graphics studios, and similar rooms. Includes service areas which serve as direct extensions of the activities conducted in these rooms, such as film libraries, tape libraries, control rooms, videotape recorder rooms, property storage, recording rooms, engineering maintenance rooms, darkrooms, preparation rooms, and equipment storage rooms.

540/550 Clinical (Non-medical)/Demonstration Space:

Clinical space includes those rooms used for the diagnosis and/or the treatment of patients in a program other than medicine (human or veterinary), dentistry, and student health care. Included are such rooms as patient examination rooms, testing rooms, and consultation rooms associated with such programs as psychology, speech and hearing, remedial reading, and remedial writing. Includes service areas which serve as direct extensions of clinical activity, such as waiting rooms, observation rooms, control rooms, and records rooms. Demonstration space includes those rooms or groups of rooms which are used to practice the principles of certain disciplines such as teaching and home economics, including demonstration schools, laboratory schools, preschool nurseries, and home management houses, if these facilities support the training of college-level students. Includes service areas which serve as direct extensions of demonstration activity, such as storerooms and laundry in a home demonstration facility and kitchen, lockers, and shower room in a laboratory school.

560/570/580 Field Buildings/Animal Quarters/Greenhouses:

Field buildings are barns or similar structures for animal shelter or the handling, storage, and/or protection of farm products, supplies, and tools, for field experiments. Animal quarters are rooms that house laboratory animals maintained by the institution for research and/or instruction purposes. Greenhouses are rooms or buildings, usually composed chiefly of glass or other light-transmitting material, for the cultivation and/or protection of plants. Includes service areas which directly serve these facilities as extensions of their activities, such as feed storage rooms or cage washing rooms in the case of animal quarters, and headhouses in the case of greenhouses. Field buildings generally would not have service areas; such areas as silos, feed units, hay storage, and seedhouses would be classified as field buildings as well.

610/620 Assembly/Exhibition Space:

An assembly area is a room designed and equipped for the assembly of large numbers of persons for such events as

dramatic, musical, devotional, livestock-judging, or commencement activities, which are not used primarily for instructional purposes. An exhibition area is a room used for exhibiting materials, works of art, artifacts, etc., and intended for general use by students and the public, such as museums and art galleries. Includes service areas which directly serve an assembly or exhibition facility as an extension of the activities in that facility.

650/660 Lounge/Merchandising Space:

A lounge is a facility that is used for rest and relaxation and typically equipped with upholstered furniture, draperies, and/or carpeting which may include vending machines. Merchandising space is a room or group of rooms used to sell products or services, including such space as bookstores, barber shops, post offices, dairy stores, student union "desks", and vending-machine areas devoted wholly to vending machines. Includes service areas which directly serve a lounge facility, such as a kitchenette, or a merchandising facility, such as supply closets, sorting rooms, freezers, telephone rooms, and private toilets.

650/660/670/680/690 Student Services Space:

Space for student services functions typically housed in a student union building, such as lounge/merchandising space (described above), but also including recreational rooms, meeting rooms, and locker areas. Recreation space includes rooms used by students (sometimes staff and public as well) for recreational purposes, such as bowling alleys, pool and billiards rooms, table tennis rooms, ballrooms, chess rooms, card-playing rooms, non-instructional music-listening rooms, and hobby rooms. Meeting rooms are generally equipped with tables and chairs, and assigned to a specific organizational unit for non-class, general purposes by groups such as student senate, student government, and community groups. Locker rooms are used for changing clothes and/or storing personal materials, such as for student books. Includes service space that serves as direct extensions of the activities in such rooms. Excludes locker rooms for physical education or intercollegiate athletics.

710 Data Processing/Computer Space:

A room or group of rooms used for processing of data by computers, such as keypunch rooms, electronic data-processing rooms, electronic computer rooms, and similar data-processing areas. Includes service space that serves as a direct extension of data processing activities, such as for card storage, paper-form storage, tape storage, control rooms, wiring rooms, equipment repair rooms, and observation rooms.

720/730 Shop and Storage Space:

Shop rooms are used for the manufacture, repair, or maintenance of products or equipment, such as carpenter, plumbing, electrical, and painting shops, and similar physical plant maintenance facilities. Includes central printing and duplicating shops, campus-wide or centralized audiovisual preparation areas, and service areas which directly serve shop activities. Excludes instructional shops or shops which support research labs. Storage rooms are used to store materials centrally in a warehouse or for inactive departmental storage. (Storage related to other types of space

follows the classification of that type of space with a service designation. The distinction between service and storage classifications rests on the possibility of physical separation of the materials stored. Storage space implies only an occasional demand for the materials stored.) Excludes vehicle storage.

Appendix B

Conversion Table

Credit Hour to Weekly Student Contact Hour
Classroom and Instructional Laboratory Use

HEGIS	Discipline	Number of Contact Hours Generated from One Credit Hour: Classrooms	Laboratory
100	Agriculture	.75	.40
101	Agriculture	.75	.25
102	Agronomy	.60	.40
104	Animal Sciences	.50	.50
105	Dairy Science	1.00	.50
106	Poultry Science	.95	.50
108	Horticulture	.60	.65
111	Agricultural Economics	.75	.25
113	Food Science and Technology	.80	.20
115	Natural Resource Management	.55	.45
200	Architecture	.75	1.50
400	Biological Sciences	.60	.50
500	Business and Management	1.00	.10
600	Communications	.90	.10
700	Computer and Information Science	.80	.50
800	Education	.80	.20
900	Engineering		
902	Aerospace and Aeronautical Engineering	.70	.40
903	Agricultural Engineering	.55	.80
906	Chemical Engineering	.90	.25
908	Civil/Construction/Transportation	.90	.15
909	Electrical/Electronics/Communications	.80	.25
910	Mechanical Engineering	.90	.20
913	Industrial and Management Engineering	.90	.20

914	Metallurgical Engineering	.80	.20
916	Ceramic Engineering	.90	.10
917	Textile Engineering	.80	.20
918	Mining and Mineral Engineering	.85	.15
921	Engineering Mechanics	.95	.10
1000	Fine and Applied Arts	.50	.90
1002	Art	.10	2.00
1003	Art History	1.00	—
1004	Music	.60	.70
1008	Dance	.30	1.30
1100	Foreign Languages	.95	.05
1200	Health Professions	.75	.25
1203	Nursing	1.00	.10(a)
1204	Dentistry	.50	.60
1209	Optometry	.80	.25
1211	Pharmacy	.75	.25
1218	Veterinary Medicine	.70	.30
1300	Home Economics	.60	.40
1400	Law	.95	.05
1700	Mathematics	.95	.05
1900	Physical Sciences	.75	.40
1902	Physics	.80	.40
1905	Chemistry	.75	.60
1911	Astronomy	.85	.15
1914	Geology	.70	.40
1920	Metallurgy	.70	.40
2000	Psychology	.90	.10
2200	Social Sciences	.95	.05
2202	Anthropology	.90	.10
2204	Economics	1.00	—
2205	History	1.00	—
2206	Geography	.95	.05
2207	Political Science	1.00	—
2208	Sociology	1.00	—

(a)Does not include time spent in clinical operations.

Appendix C

Staffing Categories

These classifications can be used in the formulae to project office space needs (room use code 300) and lounge and merchandising space needs (room use codes 650 and 660).

I. The following occupational groups are used to project office space:

Executive/Administrative/Managerial: Persons whose assignments require primary (and major) responsibility for management of the institution or a department or subdivision thereof, and whose assignments require the performance of work directly related to management policies or general business operations of the institution or subdivisional unit. All officers are included (president, vice president, dean, director) as well as officers subordinate to these with titles such as associate dean, assistant dean, or chairman. (Supervisory personnel of the technical, clerical, craft, and service/maintenance force will be reported within the specific categories of the personnel they supervise.)

Faculty: Persons whose specific assignments customarily are made for the purpose of conducting instruction, research, or public service as a principal activity and who hold academic rank of professor, associate professor, assistant professor, instructor, lecturer, or the equivalent. Does not include student teaching or research assistants.

Professional/Non-Faculty: Persons whose assignments require either college graduation or experience of such kind and amount as to provide a comparable background. Also includes staff members with assignments requiring specialized professional training who are not reported under executive or faculty, and who should not be classified under any of the following four "nonprofessional" categories of activities.

Clerical/Secretarial: Persons whose assignments typically are associated with clerical activities or are specially of a secretarial nature, including personnel who are responsible for internal and external communication, recording and retrieval of data (other than computer programmers), and/or information and other paperwork required in an office, such as bookkeepers, stenographers, clerk typists, office-machine operators, statistical clerks, payroll clerks, sales clerks, and library clerks who are not recognized as librarians.

II. The following occupational group is used to project office space and lounge/merchandising space. Those individuals requiring office space should be used for that projection; those who do not require office space should be used for projecting lounge/merchandising space.

Technical/Paraprofessional: Persons whose assignments require specialized knowledge or skills which may be acquired through experience or academic work, such as is offered in many two-year technical institutes, junior colleges, or job training programs. Such personnel include computer programmers and operators, drafters, engineering aides, junior engineers, mathematical aides, nurses (licensed, practical, or vocational), dietitians, photographers, radio operators, scientific assistants, technical illustrators, and technicians (medical, dental, electronic, physical sciences).

III. The following occupational groups are used to project lounge/merchandising space:

Skilled Crafts: Persons who assignments typically require special manual skills and a thorough and comprehensive knowledge of the processes involved in the work, acquired through on-the-job training and experience or through apprenticeship or other formal training programs. Includes mechanics and repairers, electricians, stationary engineers, skilled machinists, carpenters, compositors, and typesetters.

Service/Maintenance: Persons whose assignments require limited degrees of previously acquired skills and knowledge and who perform duties which result in or contribute to the comfort, convenience, and hygiene of staff and students or who contribute to the upkeep and care of buildings, facilities, or grounds of the institutional property. Includes chauffeurs, laundry and dry clearning operators, cafeteria and restaurant workers, truck drivers, bus drivers, garage laborers, custodial personnel, gardeners and grounds keepers, refuse collectors, construction laborers, and security personnel.